Electronic Supplementary Information (ESI)

Multi-core MgO NPs@C core-shell nanospheres for selective CO_2 capture at mild condition

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Table S1. Summary of XPS results for MgO NPs@C.

		before annealing		after annealing	
		BE(eV)[a]	RA(%)[b]	BE(eV)	RA(%)
Mg 2*p*	Mg-C			48.6	50.3
	MgO	49.3	19.4	49.3	49.7
		49.8	20.4		
	$MgCp_2$	50.3	2.3	-	-
	$Mg(OH)_2$ $MgCO_3$	50.6	57.8	-	-
O 1*s*	MgO	531.1	35.1	529.1 531.0	31.5 59.5
	$Mg(OH)_2$	531.9	39.4	-	-
	$MgCO_3$	532.9	25.5	532.8	9.00
C 1*s*	graphite	283.8	34.1	283.8	19.3
	Hydrocarbon	284.5	45.6	284.3	35.8
	O=C-O	288.9	20.3	288.5	44.8

[a] binding energy
[b] relative area

Table S2. Comparison of the Mg composite (ICP-MS) and elemental analysis for MgO NPs@C before and after annealing treatment.

	Before annealing	After annealing
Mg	10.03	19.89
C	53.43	54.58
N	0.03	0.11
H	4.83	1.31

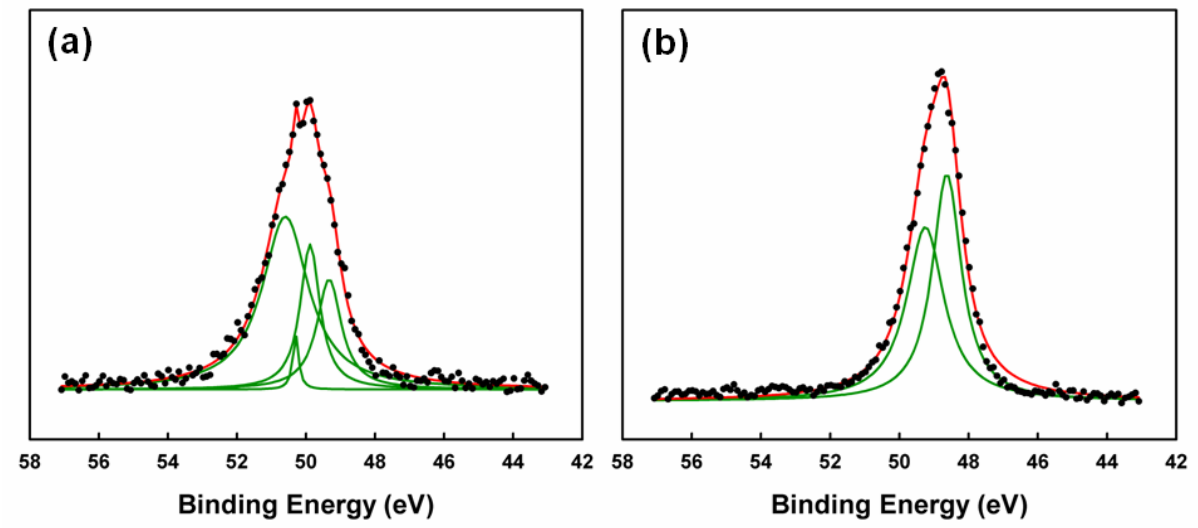


Fig. S1 Mg 2*p* XPS results of MgO NPs@C (a) before and (b) after annealing.

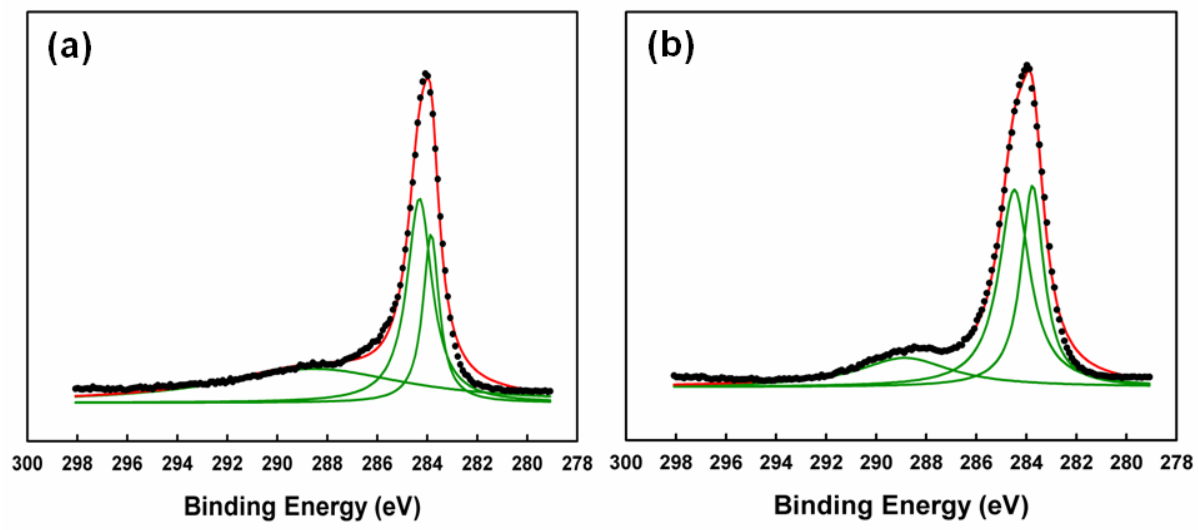


Fig. S2 C 1*s* XPS results of MgO NPs@C (a) before and (b) after annealing.

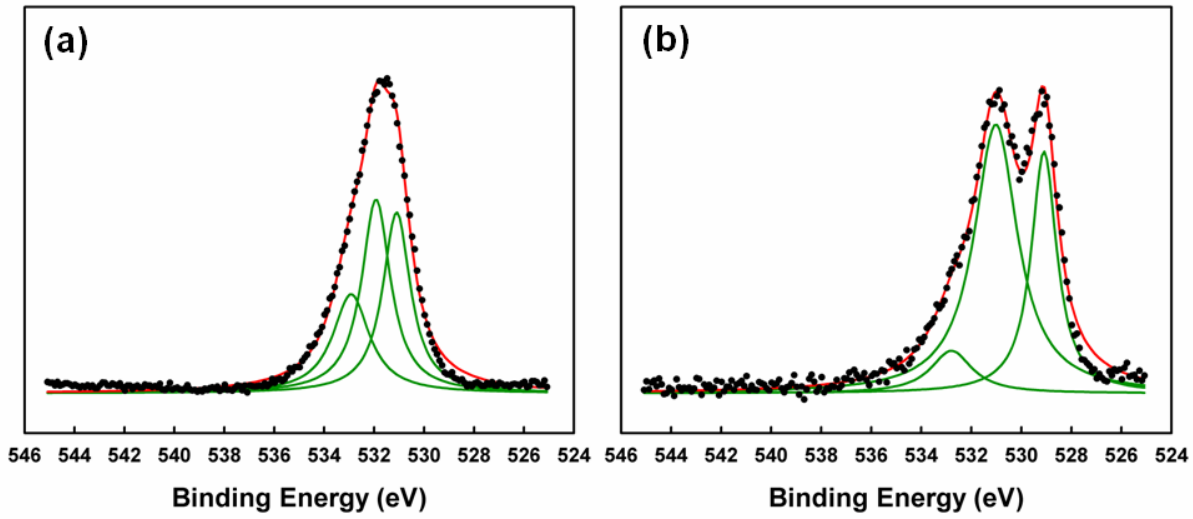


Fig. S3 O 1*s* XPS results of MgO NPs@C (a) before and (b) after annealing.

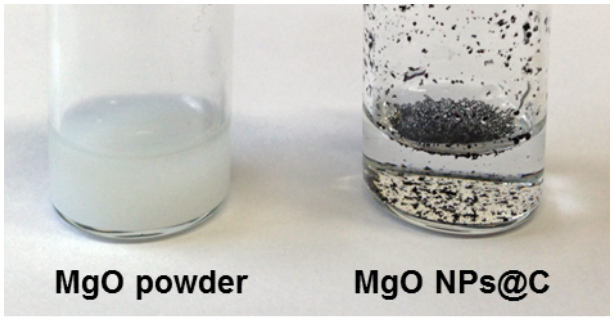


Fig. S4 Photograph showing different dispersibility of pure MgO powder and MgO NPs@C in water.

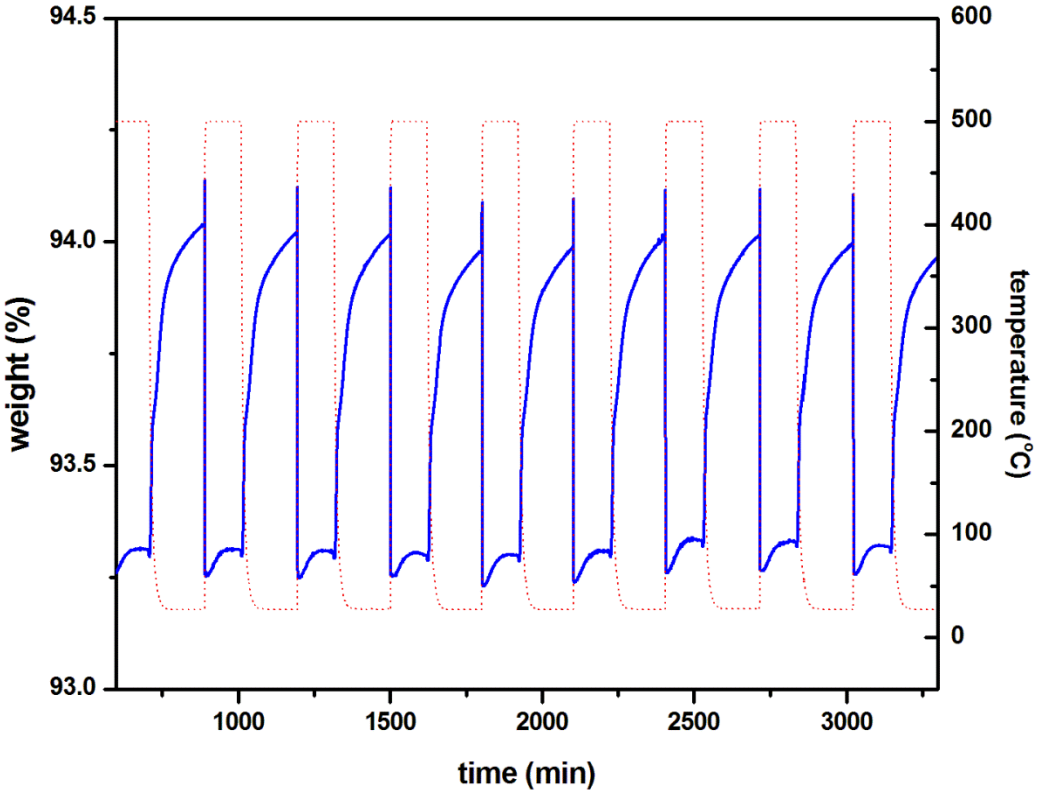


Fig. S5 CO_2 gas sorption cycling result of commercially available 50 nm sized-MgO powder.

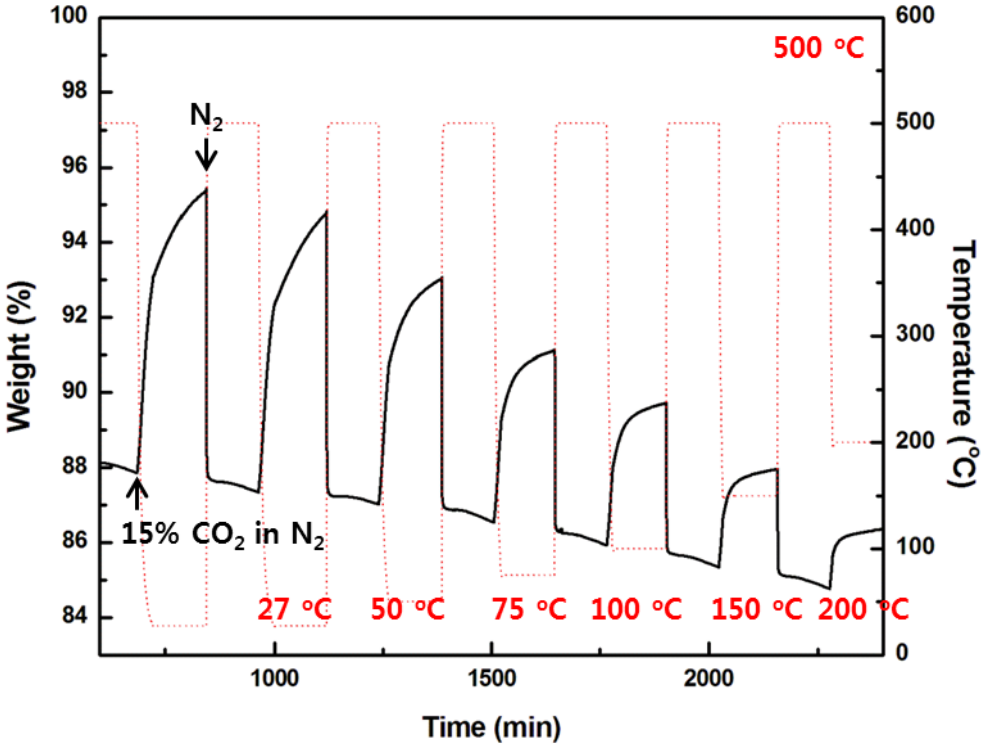
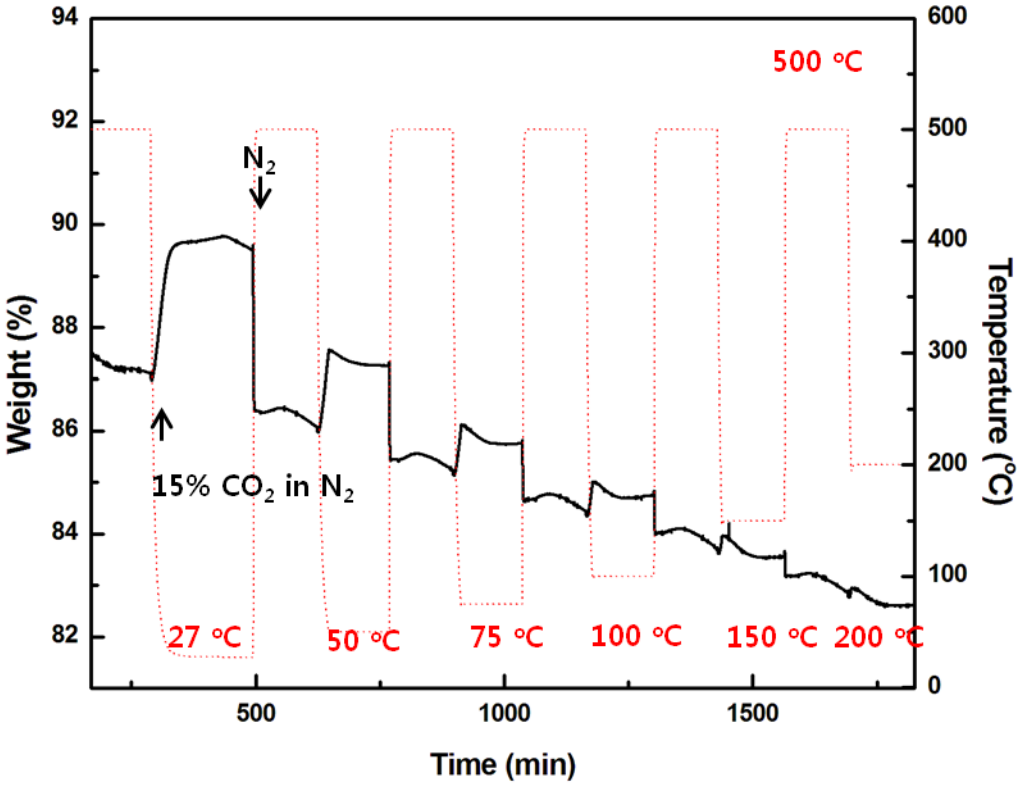


Fig. S6 CO_2 gas sorption cycling result of MgO NPs@C under different adsorption temperatu re at 27, 50, 75, 100, 150, and 200 °C.



CO_2 adsorption temperature (^oC)	27	50	75	100	150	200
adsorption capacity (wt%)	2.4	1.2	0.62	0.38	-	-

Fig. S7 CO_2 gas sorption cycling result of inner hollow carbon shell under different adsorption temperature at 27, 50, 75, 100, 150, and 200 ^oC.

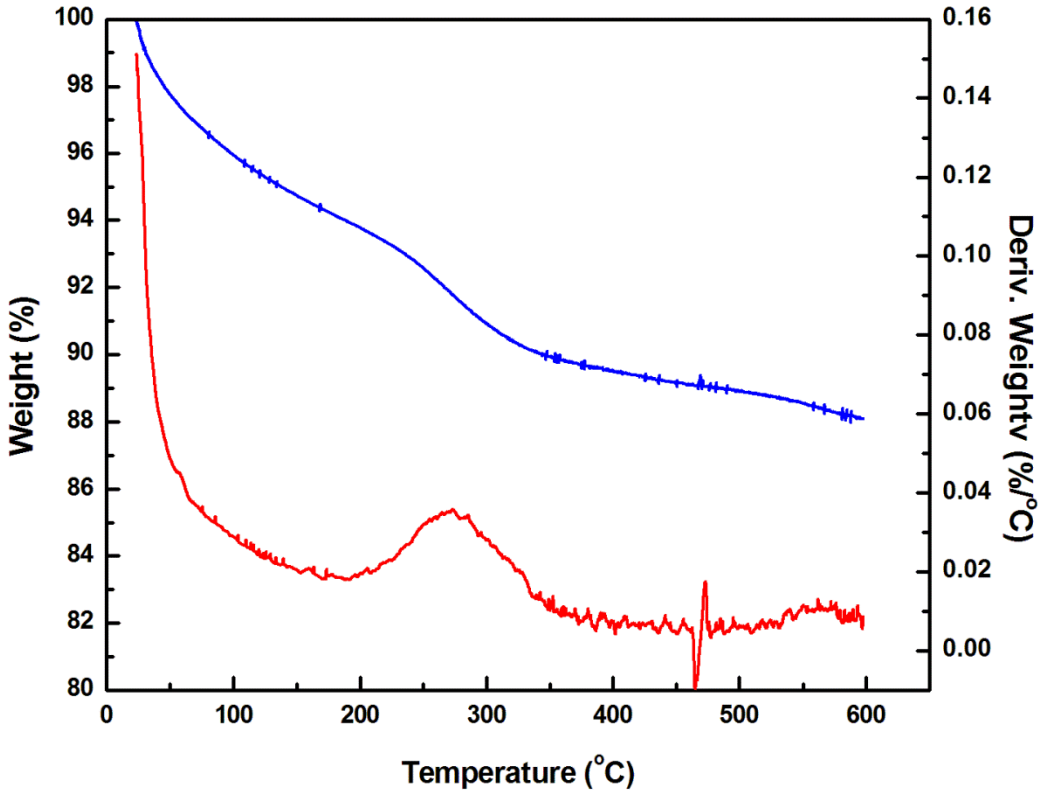


Fig. S8 Characterization of the CO_2-adsorbed MgO NPs@C. TGA trace (blue line) and its first derivative curve (red line).